

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF THE CLAIMS:

1. (Previously Presented) A time-division-multiplexed light signal channel extraction method that separates time-division-multiplexed signals into as many as N channels and extracts channel numbers in order to provide demultiplexed signals to output ports of which port numbers match with the channel numbers, comprising:

a demultiplexing step of demultiplexing the multiplexed signals into N channels and providing the demultiplexed signals to as many as N separate ports;

an extraction step of extracting a channel number of at least one channel in the N channels corresponding to said N separate ports;

a switching step of switching each of the N channels to an output port of which port number uniquely matches with the channel number of one of the N channels based on relationship between the number of the at least one channel identified in the extraction step and the output port number equal to said channel number of the one channel; and

an output step of providing the signals of said switched N channels to the output ports of which output port numbers match with the channel numbers.

2. (Previously Presented) A time-division-multiplexed light signal channel extraction method that separates time-division-multiplexed signals into as many as N channels and extracts channel numbers in order to provide demultiplexed signals to output ports of which port numbers match with channel numbers, comprising:

a demultiplexing step of demultiplexing the multiplexed signals into N channels and providing the demultiplexed signals to as many as N separate ports;

an extraction step of extracting a channel number of at least one channel in the N channels corresponding to said N separate ports;

a control step of controlling said N channels provided to the separate ports so that the number of each of the N channels uniquely matches with the output port

numbers based on relationship between the number of the one channel identified in the extraction step and an output port number equal to said channel number of the one channel; and

an output step of providing the signals of said N channels to the output ports of which output port numbers match with the channel numbers.

3. (Currently Amended) A time-division-multiplexed light signal channel extraction method that separates time-division-multiplexed signals into as many as N channels and provides the demultiplexed signals to output ports of which port numbers match with channel numbers, channel intervals of the time-division-multiplexed signals on the time axis are set in given irregular-intervals, the method comprising:

a demultiplexing step of demultiplexing irregular-intervals time-division-multiplexed light signals, ~~of which channel intervals on the time axis are not regular,~~ into N channels and providing demultiplexed signals to as many as N separate ports, wherein each of the N separate ports is set in delay time corresponding to each of the channel intervals by N delay circuits having the given irregular-intervals respectively, and wherein, when numbers of the N channels match with numbers of the output ports, the signals are provided to all the N separate ports;

a control step of monitoring signal output to the output ports and controlling the signals of said N channels provided to the separate ports so that all the N separate ports respectively output the signal output; and

an output step of providing the signals of said N channels to the output ports of which output port numbers match with the channel numbers.

4. (Previously Presented) The method as set forth in claim 3, wherein pulse width of said irregular-intervals time-division-multiplexed light signals is $\tau_{\text{send}}\text{sec}$, where i-th channel is adjacent to (i+1)-th channel, N-th channel is adjacent to the first channel, a bit rate is $Nf_0(\text{bit/s})$, the channel intervals meet relations:

$$\Delta t_i \left(i = 1, 2, \dots, N \right) \neq \Delta t_j \left(j = 1, 2, \dots, N \right) (j \neq i)$$

where $\tau_{\text{send}} \leq 1/(Nf_o)$ and $\Delta t_1 + \Delta t_2 + \dots + \Delta t_{N-1} + \Delta t_N = 1/f_o$.

5. (Previously Presented) The method as set forth in claim 3, wherein pulse width of said irregular-intervals time-division-multiplexed light signals is $\tau_{\text{send}} \text{sec}$, where i-th channel is adjacent to (i+1)-th channel, N-th channel is adjacent to the first channel, bit rate is Nf_o (bit/s), the channel intervals meet the relations:

$$\Delta t_i (i=1, 2, \dots, N) \neq \Delta t_j (j=i+1 \text{ or } j=i-1);$$

$$\Delta t_{N+1} = \Delta t_1; \text{ and}$$

$$\Delta t_{-1} = \Delta t_N$$

wherein $\tau_{\text{send}} \leq 1/(Nf_o)$ and $\Delta t_1 + \Delta t_2 + \dots + \Delta t_{N-1} + \Delta t_N = 1/f_o$.

6. (Previously Presented) A time-division-multiplexed light signal channel extraction apparatus that separates time-division-multiplexed signals into as many as N channels and extracts channel numbers in order to provide demultiplexed signals to output ports of which port numbers match with the channel numbers, comprising:

an optical time-division-demultiplexing means for demultiplexing the multiplexed signals into N channels and providing demultiplexed signals to as many as N separate ports;

a channel extraction means that is connected to N separate ports and extracts a channel number of at least one channel in the N channels corresponding to said N separate ports;

a channel switching means for switching each of the N channels to the output ports of which port numbers uniquely match with numbers of each of the N channels based on relationship between the channel number of the one channel identified by the channel extraction means and the output port number equal to the channel number of said one channel; and

an output means that has as many as N output ports and provides signals of said switched N channels to the output ports of which output port numbers match with the channel numbers.

7. (Previously Presented) A time-division-multiplexed light signal channel extraction apparatus that separates time-division-multiplexed signals into as many as N channels and extracts channel numbers in order to provide demultiplexed signals to output ports of which port numbers match with the channel numbers, comprising:

an optical time-division-demultiplexing means for demultiplexing the multiplexed signals into N channels and providing the demultiplexed signals to as many as N separate ports;

a channel extraction means that is connected to the N separate ports and extracts channel number of at least one channel in the N channels corresponding to said N separate ports;

a channel control means for controlling said N channels provided to the separate ports so that channel numbers of each of the N channels uniquely match with output port numbers based on relationship between the number of the one channel identified by the channel extraction means and an output port number equal to said number of the one channel; and

an output means that has as many as N output ports and provides the signals of said N channels to the output ports of which output port numbers match with the channel numbers.

8. (Currently Amended) A time-division-multiplexed light signal channel extraction apparatus that separates time-division-multiplexed signals into as many as N channels and provides demultiplexed signals to output ports of which port numbers match with channel numbers, channel intervals of the time-division-multiplexed signals on the time axis are set in given irregular-intervals, the apparatus comprising:

a optical time-division-demultiplexing means for demultiplexing irregular-intervals time-division-multiplexed light signals, ~~of which channel intervals on the time axis are not regular,~~ into N channels and providing demultiplexed signals to as many as N separate ports, wherein each of the N separate ports is set in delay time corresponding to each of the channel intervals by N delay circuits having the given

irregular-intervals respectively, and wherein, when the channel numbers of the N channels match with numbers of the output ports, the signals are provided to all the N separate ports;

a channel control means for monitoring signal output to the output ports and controlling the signals of said N channels provided to the separate ports so that all the N separate ports respectively output the signal output; and

an output means that has as many as N output ports and provides the signals of said N channels to the output ports of which output port numbers match with the channel numbers.

9. (Previously Presented) The apparatus as set forth in any one of claims 6-8; wherein said optical time-division-demultiplexing means comprising:

a means for coupling the multiplexed signals and chirp light pulses; and

a cross-correlating means for providing a cross-correlation signal when the multiplexed signal overlaps the chirp light pulse and converting sequence of the N channels for multiplexed signals on the time axis into unique sequence of channels on the wavelength axis to provide the demultiplexed signals to the N separate channels.

10. (Previously Presented) The apparatus as set forth in claim 9, wherein said cross-correlating means provides a cross-correlation signal by using one of four wave mixing using a semiconductor amplifier, cross phase modulation using optical fiber, cross absorption modulation using an electric field absorption type optical amplifier and quasi-phase matching in secondary nonlinear optical material.

11. (Previously Presented) The apparatus as set forth in any one of claims 6-8; wherein said optical time-division-demultiplexing means comprises:

a coupling means that provides different delays to at least either the multiplexed signals separated into N channels or gate light pulses separated into N channels so that the signals and pulses overlap at different timing in individual channels; and

as many as N cross-correlating means for providing a cross-correlation signal when the multiplexed signal overlaps the chirp light pulse.

12. (Previously Presented) The apparatus as set forth in claim 11, wherein said cross-correlating means provides the cross-correlation signal by using one of four wave mixing using a semiconductor amplifier, cross phase modulation using optical fiber, cross absorption modulation using an electric field absorption type optical amplifier and quasi-phase matching in secondary nonlinear optical material.

13. (Previously Presented) The apparatus as set forth in claim 8, wherein, pulse width of said irregular-intervals time-division-multiplexed light signals is $\tau_{\text{send}}\text{sec}$, where the i-th channel is adjacent to the (i+1)-th channel, the N-th channel is adjacent to the first channel, a bit rate is $Nf_o(\text{bit/s})$, the channel intervals meet the relations:

$$\Delta t_i \left(i = 1, 2, \dots, N \right) \neq \Delta t_j \left(j = 1, 2, \dots, N \right) (j \neq i)$$

where $\tau_{\text{send}} \leq 1/(Nf_o)$ and $\Delta t_1 + \Delta t_2 + \dots + \Delta t_{N-1} + \Delta t_N = 1/f_o$.

14. (Previously Presented) The apparatus as set forth in claim 8, wherein pulse width of said irregular-intervals time-division-multiplexed light signals is $\tau_{\text{send}}\text{sec}$, where i-th channel is adjacent to (i+1)-th channel, N-th channel is adjacent to the first channel, bit rate is $Nf_o(\text{bits})$, the channel intervals meet the relations:

$$\Delta t_i (i=1, 2, \dots, N) \neq \Delta t_j (j=i+1 \text{ or } j=i-1);$$

$$\Delta t_{N+1} = \Delta t_1; \text{ and}$$

$$\Delta t_{-1} = \Delta t_N$$

where $\tau_{\text{send}} \leq 1/(Nf_o)$ and $\Delta t_1 + \Delta t_2 + \dots + \Delta t_{N-1} + \Delta t_N = 1/f_o$.